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4, 7TH MAIN MALLESWARAM, BANGALORE -3



Certificate No.: T- 4358

PHYSICAL REQUIREMENTS FOR COARSE AGGREGATE FOR BITUMINOUS MACADAM

Lab ID : CP-RW-2017-05-04-01 **Date:** 08-05-17
Customer : Assistant Executive Engineer, Project Sub Division Yelahanka Zone, BBMP, Bangalore.
Address : Project Sub Division Yelahanka Zone, BBMP, Bangalore.
Project Name : Extension of Reva Engineering College road upto 400mts (BBMP limits) Byatarayanapura Assembly Constituency Yelhanka Zone.
Agency : M/S Satya Constructions, No:600, Down Bazar Road, Yelahanka, Bangalore-64.
Customer Reference : EE(Project)/Ynk Zone/WO/02/15-16
Source of Sample : Sample supplied by Agency
Sample Condition : Satisfactory
Date of Receipt : 04-05-17
Sample ID No : 2017-05-04-01-01
Type of Mix : BM (Bituminous Macadam)
Date of test : 05-05-17

Table 500-6 : Physical Requirements for Coarse Aggregate for Bituminous Macadam

Property	Test	Result	Specification	Method of Test
Partical Shape	Flakiness Index	12.3	Combined Flakiness & Elongation Index for BM is Maximum 35%	IS:2386 Part I
	Elongation Index	10.3		
Strength	Aggregate Impact Value	24.6	Maximum 30%	IS:2386 Part IV
Specific gravity	Specific gravity	2.64	Maximum 2.7	IS:2386 Part III
Water Absorption	Water Absorption	0.26	Maximum 2%	IS:2386 Part III

Note:

The results pertain to the samples received and tested.

All information furnished by Customer/Representative

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Samples will be disposed after 30 days from the date of issue of test certificate

Prepared By:
Harshitha



FOR CIVIL Pro.

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TEST RESULTS OF GRADATION FOR BC IS 2386 (Part 1) 1963 (RA 2007)

Lab ID : CP-RW-2017-05-12-01 Date: 14-05-17
Customer : Assistant Executive Engineer, Project Sub Division Yelahanka Zone, BBMP, Bangalore.
Address : Project Sub Division Yelahanka Zone, BBMP, Bangalore.
Project Name : Extension of Reva Engineering College road upto 400mts (BBMP limits) Byatarayanapura Assembly Constituency Yelahanka Zone.
Agency : M/S Satya Constructions, No:600, Down Bazar Road, Yelahanka, Bangalore-64.
Customer Reference : EE(Project)/Ynk Zone/WO/02/15-16
Source of Sample : Sample supplied by Agency
Sample Condition : Satisfactory
Date of Receipt : 12-05-17
Sample ID No : 2017-05-12-01-01
Type of Mix : BC-Plant (Bituminous Concrete)
Date of test : 12-05-17
Oven Dry Weight : 5000 Grams

IS Sieve Size (mm)	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Specified limits as per MORTH specification table 500-17(grading-2)
19	0	0	0.0	100.0	100
13.2	89	89	1.8	98.2	90-100
9.5	702	791	15.8	84.2	70-88
4.75	895	1686	33.7	66.3	53-71
2.36	587	2273	45.5	54.5	42-58
1.18	492	2765	55.3	44.7	34-48
0.6	503	3268	65.4	34.6	26-38
0.3	528	3796	75.9	24.1	18-28
0.15	458	4254	85.1	14.9	12-20
0.075	350	4604	92.1	7.9	4-10
PAN	396	5000	100	0.0	0

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TEST REPORT OF AGGREGATE STRIPPING VALUE OF ROAD AGGRGATE (IS:6241)

Lab ID : CP-RW-2017-05-12-01 Date: 15-05-17
Customer : Assistant Executive Engineer, Project Sub Division Yelahanka Zone, BBMP, Bangalore.
Address : Project Sub Division Yelahanka Zone, BBMP, Bangalore.
Project Name : Extension of Reva Engineering College road upto 400mts (BBMP limits) Byatarayanapura Assembly Constituency Yelhanka Zone.
Agency : M/S Satya Constructions, No:600, Down Bazar Road, Yelahanka, Bangalore-64.
Customer Reference : EE(Project)/Ynk Zone/WO/02/15-16
Source of Sample : Sample supplied by Agency
Sample Condition : Satisfactory
Date of Receipt : 12-05-17
Sample ID No : 2017-05-12-01-01
Type of Mix : BC(Bitumenous Concrete)
Date of test : 12-05-17

Type of Binder : 60/70
% of Binder Used : 5.0%
Weight of Aggregate : 200.0 gm
Weight of Binder : 10.0 gm
Temperature of water bath : 40°C

No of test	Retained Stripping Percentage	Stripping Percentage	Average Retained Stripping Percentage	Secified limits as per MORTH specification table 500-8
1	98.0	2.0	98.2	Minimum Retained Coating 95%
2	98.5	1.5		
3	98.0	2.0		

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TESTS RESULTS ON STABILITY OF MIX

Lab ID : CP-RW-2017-05-12-01 Date: 15-05-17
Customer : Assistant Executive Engineer, Project Sub Division Yelahanka Zone, BBMP, Bangalore.
Address : Project Sub Division Yelahanka Zone, BBMP, Bangalore.
Project Name : Extension of Reva Engineering College road upto 400mts (BBMP limits) Byatarayanapura Assembly Constituency Yelahanka Zone.
Agency : M/S Satya Constructions, No:600, Down Bazar Road, Yelahanka, Bangalore-64.
Customer Reference : EE(Project)/Ynk Zone/WO/02/15-16
Source of Sample : Hot Mix Plant, Bangalore
Sample Condition : Satisfactory
Date of Receipt : 12-05-17
Sample ID No : 2017-05-12-01-01
Type of Mix : BC (Bituminous Concrete)
Date of test : 12-05-17

The results of the tests conducted on the Bituminous Concrete mix sample are as follow

Sl.No	Particulars of observations	TEST 1	TEST 2	Secified limits as per MORTH specification table 500-11
1	Marshal Stability at 60°C, KN	11.14	11.03	10KN(min)
2	Marshal flow at 60°C, mm	3.52	3.61	2-4
3	Percent air Voids	4.82	4.73	3-5
4	Percent Voids in mineral Aggregate(VMA %)	14.28	14.16	13-15
5	Percent Voids filled with Bitumen(VFB %)	71.87	70.63	65-75
6	Density, g/cc	2.25	2.26	-

Note:-

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TEST RESULTS OF GRADATION FOR BC
IS 2386 (Part 1) 1963 (RA 2011)

Date: 24-05-17

Lab ID : CP-RW-2017-05-22-01
Customer : Assistant Executive Engineer, Project Sub Division Yelahanka Zone, BBMP,
Address : Project Sub Division Yelahanka Zone, BBMP, Bangalore.
Project Name : Extension of Reva Engineering College road upto 400mts (BBMP limits)
Byatarayanapura Assembly Constituency Yelahanka Zone.
Agency : M/S Satya Constructions, No:600, Down Bazar Road, Yelahanka, Bangalore-64.
Customer Reference : EE(Project)/Ynk Zone/WO/02/15-16
Source of Sample : Sample supplied by Agency
Date of Receipt : 22-05-17
Sample ID No : 2017-05-22-01-01
Type of Mix : BC (Bituminous Concrete)
Date of test : 22-05-17

Sl.no	Description	Index	Trail 1	Trail 2
1	Weight of the Sample	A	500	501
2	Weight of the sample After extraction	B	470	472
3	Bitumen percentage	$\frac{A-B}{A} \times 100$	6.00	5.79
4	Average percentage	%	5.9	

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Lab ID : CP-RW-2017-05-22-01
Sample ID : 2017-05-22-01-01

Date: 24-05-17

AFTER EXTRACTION - Trail-1

Total Weight of the Sample(gm) : 470

IS Sieve Size (mm)	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Secified limits as per MORTH specification table 500-23(grading-2)
19	0	0	0.0	100.0	100
13.2	2	2	0.4	99.6	90-100
9.5	56	58	12.3	87.7	70-88
4.75	143	201	42.8	57.2	53-71
2.36	52	253	53.8	46.2	42-58
1.18	29	282	60.0	40.0	34-48
0.6	11	293	62.3	37.7	26-38
0.3	66	359	76.4	23.6	18-28
0.15	45	404	86.0	14.0	12-20
0.075	21	425	90.4	9.6	4-10

Total Weight of the Sample(gm) : 472

IS Sieve Size (mm)	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Secified limits as per MORTH specification table 500-23(grading-2)
19	0	0	0.0	100.0	100
13.2	3	3	0.6	99.4	90-100
9.5	58	61	12.9	87.1	70-88
4.75	147	208	44.1	55.9	53-71
2.36	59	267	56.6	43.4	42-58
1.18	31	298	63.1	36.9	34-48
0.6	9	307	65.0	35.0	26-38
0.3	69	376	79.7	20.3	18-28
0.15	34	410	86.9	13.1	12-20
0.075	19	429	90.9	9.1	4-10

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PHYSICAL REQUIREMENTS FOR COARSE AGGREGATE FOR BITUMINOUS CONCRETE

Lab ID : CP-RW-2017-05-12-01 **Date:** 15-05-17
Customer : Assistant Executive Engineer, Project Sub Division Yelahanka Zone, BBMP, Bangalore.
Address : Project Sub Division Yelahanka Zone, BBMP, Bangalore.
Project Name : Extension of Reva Engineering College road upto 400mts (BBMP limits) Byatarayanapura Assembly Constituency Yelhanka Zone.
Agency : M/S Satya Constructions, No:600, Down Bazar Road, Yelahanka, Bangalore-64.
Customer Reference : EE(Project)/Ynk Zone/WO/02/15-16
Source of Sample : Sample supplied by Agency
Sample Condition : Satisfactory
Date of Receipt : 12-05-17
Sample ID No : 2017-05-12-01-01
Type of Mix : BC (Bituminous Concrete)
Date of test : 12-05-17

Table 500-16 : Physical Requirements fo Coarse Aggregate for Bituminous Concrete

Property	Test	Result	Specification	Method of Test
Partical Shape	Flakiness Index	12.6	Combined Flakiness & Elongation Index for BC is Maximum 35%	IS:2386 Part I
	Elongation Index	11.3		
Strength	Aggregate Impact Value	22.8	Maximum 24%	IS:2386 Part IV
Specific gravity	Specific gravity	2.65	Maximum 2.7	IS:2386 Part III
Water Absorption	Water Absorption	0.25	Maximum 2%	IS:2386 Part III

Note:

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TEST REPORT OF PHYSICAL PROPERTIES OF CEMENT - 53 Grade

Lab ID : CP-2017-05-26-06 **Date:** 27-05-17
Customer : Assistant Executive Engineer, Project Sub Division Yelahanka Zone, BBMP, Bangalore.
Address : Project Sub Division Yelahanka Zone, BBMP, Bangalore.
Project Name : Extension of Reva Engineering College road upto 400mts (BBMP limits) Byatarayanapura Assembly Constituency Yelhanka Zone.
Agency : M/S Satya Constructions, No:600, Down Bazar Road, Yelahanka, Bangalore-64.
Customer's Reference : EE(Project)/Ynk Zone/WO/02/15-16
Source of Sample : Sample supplied by Agency
Sample Condition : Satisfactory
Date of Receipt : 26-05-17
Sample ID No : 2017-05-26-06-01
Sample Type : Birla Super 53grade
Reference to BIS codes : IS 12269 : 2013, 53 Grade Ordinary Portland cement Specification ,
IS 4031 (Part 1,2 3,4,5, 6,11):1988
IS 4031 Part 1 DETERMINATION OF FINENESS BY DRY SIEVING, Clause 4.4
IS 4031 Part 2, Determination of Fineness by Blaine Air Permeability Method, Clause 5
IS 4031 Part 3, Determination of Soundness, Clause 5, Clause 6
IS 4031 Part 4, Determination of Consistency of Standard Cement Paste, Clause 5
IS 4031 Part 5, Determination of Initial & Final Setting Time, Clause 5
IS 4031 Part 11, DETERMINATION OF DENSITY , Clause 6
Date of test : 26-05-17

Sl.No.	Physical properties	Results	Requirement as per IS 12269: 2013
1	Fineness by dry sieving (%)	2.45	—
2	Finess by Air permeablity method (m ² /kg, Min)	265.6	225m ² /kg, Min
3	Density (gm/cc)	3.22	—
4	Standard Consistency (%)	28.0%	Not specified
5	Initial Setting time	175 minutes	Not less than 30 minutes
6	Final Setting time	260 minutes	Not more than 600 minutes
7	Soundness (Le Chatelier's Method)	2mm	Not more than 10 mm

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Certificate No.: T- 4358

TEST REPORT OF PHYSICAL PROPERTIES OF CEMENT - 53 Grade

Lab ID : CP-2017-05-26-06 **Date:** 23-06-17
Customer : Assistant Executive Engineer, Project Sub Division Yelahanka Zone, BBMP, Bangalore.
Address : Project Sub Division Yelahanka Zone, BBMP, Bangalore.
Project Name : Extension of Reva Engineering College road upto 400mts (BBMP limits) Byatarayanapura Assembly Constituency Yelahanka Zone.
Agency : M/S Satya Constructions, No:600, Down Bazar Road, Yelahanka, Bangalore-64.
Customer's Reference : EE(Project)/Ynk Zone/WO/02/15-16
Source of Sample : Sample supplied by Agency
Sample Condition : Satisfactory
Date of Receipt : 26-05-17
Sample ID No : 2017-05-26-06-01
Sample Type : Birla Super 53grade
Reference to BIS codes : IS 12269 : 2013, 53 Grade Ordinary Portland cement Specification ,
IS 4031 Part 4, Determination of Consistency of Standard Cement Paste, Clause 5
IS 4031 Part 6, Determination of Compressive Strength, Clause 6
Date of test : 26-05-17

Compressive Strength			
Sl.No.	Physical properties	Results	Requirement as per IS 12269: 2013
1	3 Days	27.5N/mm ²	Not less than 27 N/mm ²
2	7 Days	38.0N/mm ²	Not less than 37 N/mm ²
3	28 Days	54.5N/mm ²	Not less than 53 N/mm ²

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TEST REPORT ON COARSE AGGREGATES

Lab ID : CP-2017-05-26-06 Date: 29-05-17
Customer : Assistant Executive Engineer, Project Sub Division Yelahanka Zone, BBMP, Bangalore.
Address : Project Sub Division Yelahanka Zone, BBMP, Bangalore.
Project Name : Extension of Reva Engineering College road upto 400mts (BBMP limits) Byatarayanapura Assembly Constituency Yelhanka Zone.
Agency : M/S Satya Constructions, No:600, Down Bazar Road, Yelahanka,
Customer Reference : EE(Project)/Ynk Zone/WO/02/15-16
Source of Sample : Sample supplied by Agency
Sample Condition : Satisfactory
Date of Receipt : 26-05-17
Sample ID No : 2017-05-26-06-2(a)
Sample Type/ Size : 20mm down size coarse aggregate
Reference to BIS codes : IS: 383:2016 (Specification for Coarse and fine Aggregates)
IS: 2386 :1963(Part - 1,3,4) RA2011
IS 2386 Part 1: Particle Size and Shape
IS 2386 Part 3: Specific gravity, Density, Voids, Water Absorption
IS 2386 Part 4: Mechanical Properties
Date of test : 26-05-17

SIEVE ANALYSIS (PARTICLE SIZE DISTRIBUTION) OF 20MM DOWN COARSE AGGREGATE:

Total weight taken : 5000 grams

Sample No.	Sieve No.	Weight Retained in gms	Cumulative Weight Retained in gms	% Cumulative Weight Retained	% Passing	Required as per IS 383:2016
1	40 mm	0	0	0	100	100
2	20 mm	243	243	4.9	95.1	90-100
3	10 mm	2486	2729	54.6	45.4	25-55
4	4.75 mm	2134	4863	97.3	2.7	0-10
5	Pan	137	5000	100	0	—

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TEST REPORT ON COARSE AGGREGATES

Lab ID : CP-2017-05-26-06
Sample ID No : 2017-05-26-06-2(a)

Date: 29-05-17

PHYSICAL PROPERTIES

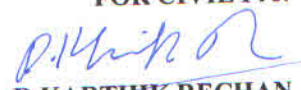
SLno	Tests	Result	Requirements as per IS:383-2016
1	Flakiness Index(%)	12.4	Combined Flakiness & Elongation Index Shall not Exceed 40% for Uncrushed & Crushed Aggregate
2	Elongation Index(%)	11.5	
3	Specific Gravity	2.68	—
4	Bulk Density(Loose) (Kg/l)	1.55	—
5	Bulk Density(Compacted) (Kg/l)	1.59	—
6	Water Absorption(%)	0.23	—
7	Aggregate crushing Value(%)	24.2	Max 30% for Aggregates to be used in concrete for wearing Surface, In case Aggregate Crushing Value Exceeds 30% then the test for ten percent fines should be conducted for Aggregates to be used in concrete other than for wearing Surface.
8	Aggregate Impact Value(%)	23.2	30% for Aggregates to be used in concrete for wearing Surface, 45% for Aggregates to be used in concrete other than for wearing Surface.

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